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THE LEVEL OF ECONOMIC DEVELOPMENT AND THE IMPACT OF FINANCIAL STRUCTURE ON ECONOMIC GROWTH: EVIDENCE FROM DYNAMIC PANEL DATA ANALYSIS

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ABSTRACT

The objective of this paper is to examine the impact of financial structure on economic growth and also to investigate whether the impacts are different between countries with difference levels of income; low- and middle-income countries, and high-income countries. This paper uses a panel data approach and include 44 countries. The Generalised Method of Moments (GMM) system approach has been used in estimation process. The findings from the estimation suggest that to have more developed stock markets relative to the banking sector will promote better growth in high-income countries but not in the low- and middle-income countries. This paper also finds strong evidence that the effect of financial structure on investment depends on the level of income of the country.

Keywords: financial structure, economic growth, panel data

INTRODUCTION

Many economists believe that financial intermediaries play important roles in economic growth. The earliest writer that linked financial sector and economic growth was Bagehot ([1873], 1962) who argued that financial intermediation was critical for rapid industrialization of England in the early nineteenth century. During that period, information was used to divert funds from poor-quality investments to high-quality investments, thus enhancing the overall efficiency of investment. Another important writer in this area is Schumpeter (1912) who

suggested that financial intermediaries promote growth by identifying and redirecting funds toward innovative projects. In his book *The Theory of Economic Development,* Schumpeter stressed that the services provided by financial intermediaries in mobilizing funds, evaluating and selecting projects, monitoring entrepreneurs, and facilitating transactions are essential for technological innovation and economic development. More recently, Gurley and Shaw (1955) in their paper emphasized the role of financial intermediaries in the credit supply process. They argued that the difference in development between developed and underdeveloped countries are because the developed countries have financial systems that are highly organized, and which are designed to facilitate the flow of loan able funds between savers and investors.

Recent studies by Beck, Levine, and Loayza (2000a) and Levine, Loayza, and Beck (2000) confirm that well-functioning banks accelerate economic growth. However, these studies omit measures of stock market development. To improve this, Rousseau and Wachtel (2000) employ panel techniques to assess the relationship between stock markets, banks and growth. They used the difference panel estimator to remove any bias created by unobserved country-specific effects and to eliminate parameter inconsistency arising from simultaneity bias. Beck and Levine (2004) employ the system panel estimator to investigate the impact of stock markets and banks on economic growth. A system panel estimator increases the consistency and efficiency of estimation. Findings from Rousseau and Wachtel (2000), and Beck and Levine (2004) has shown that both stock markets and banks are important for economic growth. However, the impact of stock markets and banks on economic growth in these studies has been analyzed individually. To improve this, Levine (2002) has investigated the impact of financial structure and overall financial development on real per capita GDP growth, real per capita capital growth, total factor productivity growth, and private saving. Beck and Levine (2002) have examined the impact of financial structure, overall financial development and legal system efficiency on industrial expansion, the creation of new establishment, and the efficiency of capital allocation. The findings from both studies show that the overall level of financial development and effective legal system are important for economic growth, while financial structure is not relevant for growth. These studies, however, did not investigate the possibility that the impacts of financial structure on economic growth are different depending on the level of development.

Given this background, the main objective of this paper is to examine the relationship between financial structure and economic growth. For this purpose, financial structure indicators that measure the relative importance of stock markets and banking sector in the economy were constructed. To examine the impact of financial structure on the difference levels of income, this paper has

divided the countries into two groups, low- and middle-income countries, and high-income countries, so that the impacts of financial structure on economic growth in these groups can be compared.

LITERATURE REVIEW

Recently, theoretical work on the finance-growth nexus has incorporated the role of financial services in the endogenous growth model to analyze the interaction between financial markets and long-run economic growth. Some authors stressed the importance of financial intermediaries in acquiring information about investment and allocating resources. They defend their view by pointing out that individual savers may have difficulties in identifying the investment projects that generate the highest returns, because of lack of information, whereas financial institutions have a comparative advantage in collecting information on different investment projects and are therefore more able to finance those projects that earn the highest returns. If individuals hold their savings at financial institutions and the latter use these savings to finance investment, the efficient allocation of these resources will be improved. Thus, financial intermediation promotes growth because it allows a higher rate of return to be earned on capital (Boyd & Prescott, 1986; Greenwood & Jovanovic, 1990; King & Levine, 1993a). In other words, financial development reduces the costs of acquiring information about firms and managers, and lowers the costs of conducting transactions. This can reduce adverse selection, and enable savers to invest in risky (but more productive) entrepreneurs.

Some authors look at the monitoring and control role of banks. Diamond (1984), for instance, shows that households delegate financial intermediaries as monitors to take an active role in firms' activities to get information and maintain discipline to prevent incentive problems. They argued that the absence of arrangements that enhance corporate control may impede the mobilization of savings from individual savers and thereby keep capital from flowing to profitable investments. In terms of long-run growth, financial arrangements that improve corporate control tend to promote faster growth by improving the allocation of capital (Stiglitz & Weiss, 1981, 1983; Bencivenga & Smith, 1993). Other studies stress the role of commitment and emphasize the role of banks in offering financial contracts not available in competitive markets. Mayer (1988), for example, observes that intermediaries make long-term relationships possible by devising contracts that ensure that firms fulfill their commitments.

From a different viewpoint, some authors look at the risk-sharing role of financial intermediaries. They argued that the risk-sharing role performed by financial intermediaries would allow individuals to share the uninsurable risk of

idiosyncratic shocks, such as unobservable taste or liquidity shocks, and diversifiable risk deriving from the volatility of asset returns. Bencivenga and Smith (1991), for example, in their models stress the role of financial intermediaries in reducing liquidity risks. They show that financial intermediaries increase the productivity of investment by directing funds to illiquid, high-yield technology and reducing the investment waste due to premature liquidation. In this model, individuals face uncertainty about their future liquidity needs. They can choose to invest in liquid assets with low productivity and/or illiquid assets, which is riskier but has high productivity. Under these conditions, banks can offer liquid deposits to savers and undertake a mixture of liquid low return investments to satisfy demand deposits, and illiquid high-return investments. By providing demand deposits and choosing an appropriate mixture of liquid and illiquid investments, banks provide complete insurance to savers against liquidity risk while simultaneously facilitating long-run investments in high-return projects and accelerating growth.

Other authors point out the importance of the portfolio diversification role of financial intermediaries. The basic intuition is straightforward. While savers generally do not like risk, high-return projects tend to be riskier than low-return projects. Thus, financial markets that ease risk diversification tend to induce a portfolio shift toward projects with higher expected returns. In the Saint-Paul (1992) model, for example, agents can choose between two technologies. One technology is highly flexible and allows productive diversifications, but has low productivity; the other one is rigid, more specialized and more productive. The economy is exposed to shocks to consumer preferences, which may result in a lack of demand for some products. Therefore, in the absence of financial markets risk-averse individuals may prefer technological flexibility rather than high productivity. Financial markets, in contrast, allow individuals to hold a diversified portfolio to insure themselves against negative demand shocks and, at the same time, to choose the more productive technology.

Besides the focus on banking, there is also theoretical literature on the risk-sharing role of stock markets and economic growth. Levine (1991) and Bencivenga, Smith, and Starr (1995), for example, derived models where more liquid stock markets (markets where it is less expensive to trade equities) reduce the disincentives to investing in long-duration projects because investors can easily sell their stake in the project if they need their saving before the project matures. Stock market, therefore, facilitates investment in longer-run, higher-return projects that boost productivity growth. The stock market also allows agents to reduce rate-of-return risk by portfolio diversification. Those twofold insurance functions increase willingness to invest in less liquid, more productive projects, and avoid unnecessary terminations. As a result, setting up a stock market raises the productivity of investment and the growth rate.

Empirically, studies on the link between financial intermediaries and growth have moved to panel data analysis, which could potentially combine the positive characteristics of the time series approach and cross-section analysis. This is because averaging data over such long periods as is normally done in cross-section analysis may mask some important features of the growth path of the economy. This is why most of the empirical growth literature recently has generally adopted the use of panels, thereby allowing for smoothing out the business cycle fluctuations in output growth without unnecessarily masking all the dynamics in the data. Among other studies that used panel data approach is one by Beck et al. (2000a) who examined the channels through which financial intermediary development is associated with growth. Specifically, they examine whether the level of banking sector development exerts a causal impact on real per capita gross domestic product (GDP) growth, capital per capita growth, productivity per capita growth and private saving rates. The study used panel data for 63 countries over the period 1960–1995, and finds that banks exert a strong, causal impact on real per capita GDP growth and per capita productivity growth. Meanwhile, the panel data study by BenHabib and Spiegel (2000) shows that indicators of financial development are correlated with both total factor productivity growth and investment. In addition, the results also show that the indicators of financial development that are correlated with total factor productivity growth differ from those that encourage investment. Levine et al. (2000) in their study, use panel data to evaluate whether the exogenous components of financial intermediary development influence economic growth. For the dynamic panel techniques, data for 74 countries are averaged over 5-year intervals covering the period 1960–1995. By using the GMM estimators developed for dynamic models of panel data, they find that the exogenous component of financial intermediary development is positively associated with economic growth.

In contrast with the finance-growth relationship, only a few empirical studies can be found on the relationship between stock market development and growth. Levine and Zervos (1998), for example, evaluate the empirical relationship between various measures of stock market development, banking development, and long run growth. Using data for 47 countries over the period 1976–1993, they find that, even after controlling for many factors associated with growth, stock market liquidity and banking development are both positively and robustly correlated with contemporaneous and future rates of economic growth. Since measures of stock market liquidity and banking development both enter the growth regression significantly, they suggest that banks provide different financial services from those provided by stock markets. In another paper, Levine and Zervos (1996) by using pooled cross-country, time series regression of 44 countries for the period from 1976 to 1993 also find that stock market development is positively associated with economic growth. Meanwhile,

Demirgüc-Kunt and Levine (1995) in their study of 41 countries over 1986–1993 find a rough, positive correspondence between per capita income and stock market development. They also find that market capitalization and the value-traded ratio are positively correlated with the indicator of financial intermediary development, showing that stock market and financial intermediaries are generally complements. Rousseau and Wachtel (2000) examine the relationship between equity markets and economic growth with panel data for a set of 47 countries with annual data for 1980–1995. They explore the effects of two aspects of stock market development: the size of the market as indicated by total market capitalization and a combination of size and liquidity in the market as indicated by the volume of trading activity. The results show leading roles for stock market liquidity and the intensity of activity in traditional financial intermediaries on per capita output.

In examining the effects of financial structure on economic growth, most of the studies have examined the relative merits of bank-based versus market-based financial systems. In bank-based financial systems such as in Germany and Japan, banks play a leading role in mobilizing savings, allocating capital, overseeing the investment decisions of corporate management and in providing risk management vehicles. In market-based financial systems such as in England and the United States, securities markets share centre stage with banks in term of getting society's savings to firms, exerting corporate control, and easing risk management. On this issue, Levine (1997) argues that banks or markets provide complementary financial services to the company, with both having positive implications for economic growth. Meanwhile, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998) argue that the legal system is the primary determinant of the effectiveness of the financial system in facilitating innovation and growth. This view predicts that the efficiency of the legal system will be positively related to innovation and growth. Results from empirical studies on the relationship between financial structure and growth seem consistent with La Porta et al. For example, Beck, Demirgüc-Kunt, Levine, and Maksimovic (2000b) find that distinguishing countries by financial structure does not help in explaining cross-country differences in long-run GDP growth, industrial performance, new firm formation, firm use of external funds, or firm growth. Levine (2002) shows that financial structure is not a good predictor of real per capita GDP growth in a cross-country growth framework. He also finds that financial structure is not a good predictor of capital accumulation, productivity growth and saving rates. Beck and Levine (2000) show that financially dependent industries do not grow faster in bank-based or market-based financial systems. Meanwhile, Demirgüc-Kunt and Maksimovic (2000) show that financial structure is not a robust predictor of the proportion of firms that grow faster.

DATA AND METHODOLOGY

Data

This paper uses a panel data approach, which has both a time series and cross-section dimension. This approach is the best procedure to account for the diversity and experience within and between countries because panel data has several advantages over purely cross-sectional estimation. First, we could take into account how financial structure over time within a country may have an effect on the country's growth performance. Second, in a panel data approach, we are able to control for unobserved country-specific effects and thereby reduce biases in the estimated coefficients. Thirdly, panel data enables us to study the dynamics of adjustment. Panel data also make the data less likely to be serially correlated than they would be in a time series setup. Finally, panel data eliminate the aggregation biases resulting from aggregating across countries.

In this paper, the panel data to study the relationship between financial structure and economic growth and associated control variables are generated by taking the average of non-overlapping five-year periods (1975–1979, 1980–1984, 1985–1989, 1990–1994 and 1995–1997) except for the last observation which based on a three-year average and include 44 countries (out of this, 23 are low- and middle-income countries, and 21 are high-income countries). This gives five observations per variable per country. The classification of income groups is based on World Bank and according to 1999 Gross National Income (GNI) per capita. The groups are: low-income, $755 or less; middle-income, $755–$9265; and high-income, $9266 or more. A list of countries in the sample is in Appendix 1. By taking non-overlapping five-year averages, we partly avoid picking up business-cycle frequency relations between financial sector development and economic growth. This method has been used in many empirical growth studies to smooth out business cycle fluctuations. The source of data is the World Bank CD-ROM World Development Indicators 2000. The data for stock market indicators are taken from the database developed by Beck, Demirgüc-Kunt, and Levine (2000c).

Financial Structure and Growth Indicators

To examine the effect of financial structures on growth, this paper has constructed several indicators to capture the structure of financial sector in the economy. Since there is no widely accepted empirical definition of financial structure, this paper uses four indicators of financial structure to measure the comparative size and activity of stock markets and banks. The indicators are constructed so that higher values indicate more market-based financial systems. The first indicator is the ratio of market capitalization to private sector credit

(fs_1). This indicator measures the comparative size of stock market to the banking sector development (Structure-Size). The second indicator is the ratio of value traded to private sector credit (fs_2). This indicator measures the comparative activity of stock market to banking sector development (Structure-Activity). The third indicator is an alternative measure of Structure-Size of financial structure, constructed by taking the ratio of market capitalization to liquid liabilities (fs_3). The fourth indicator is the ratio of value traded to liquid liabilities (fs_4). This is an alternative measure for Structure-Activity of financial structure.

Since, there is little reason to favor one particular measure of financial structure over another; this paper has merged these two measures to produce the overall measure of financial structure. The first measure of Overall-Structure (FS_1) was constructed by taking the average of fs_1 and fs_2. Meanwhile, the second measure of Overall-Structure (FS_2) was constructed by taking the average of fs_3 and fs_4. As in the case of Structure-Size and Structure-Activity, higher values of Overall-Structure represent a higher degree of stock market development relative to the development of the banking system. This paper uses two measures for growth. The first measure is the per capita growth rate of GDP (GDPPG). This is the most commonly used indicator for economic growth in the empirical studies between finance and growth. Alternatively, this study uses the ratio of investment to GDP (INV), where investment is measured by gross capital formation.

Control Variables

In order to assess the relationship between financial structure and economic growth, a wide array of control variables are included in the analysis. The control variables used in this study are the five-year average of the ratio of government consumption to GDP (GOV), the five-year average of the inflation rate (INF), the five-year average of the ratio of trade to GDP (TRADE), and the initial income (LINC). The variable GOV attempts to describe fiscal policy and measures the role of government in economic activity. The expected sign of this variable in the growth equations may be either positive or negative. GOV may appear with a negative sign if the government consumption of the countries in this study is generally larger than would be called as optimal, leading to high tax rates and/or debt financing, which crowds out private investment. On the other hand, GOV should appear with a positive sign, if government expenditures in these countries lead to the provision of necessary public goods. In this study, GOV is measured by the ratio of government consumption expenditure to GDP.

The next variable, INF attempts to measure the inflationary environment. This may reflect monetary policy, macroeconomic shocks and other policies that might cause such an environment. INF should appear with negative signs in the growth equations, based on the assumption that in a highly inflationary

environment economic activity is adversely affected. First, high inflation reduces the holding of money, which makes economic transactions in the economy costlier and/or more time consuming. Second, it has a negative impact on investment decisions, since expectations of profitability are now highly uncertain. The annual growth rate of Consumer Prices Index (CPI) has been used to measure this variable. The variable TRADE attempts to measure the impact of trade performance on economic growth and to some extent the openness of the economy. This variable is the sum of exports and imports divided by GDP. Based on the hypothesis that better export performance contributes to higher economic growth, we expect a positive sign for TRADE in the growth equation. The initial income (LINC) is incorporated in the regression based on the assumption that initial economic conditions are important in explaining the different growth experiences between countries, known also as the convergence hypothesis. The convergence hypothesis suggests that countries with a lower per capita income tend to grow faster. Based on this hypothesis, we expect a negative sign for LINC in the growth equation. In the analysis, the initial income is the real GDP per capita in 1975.

Estimation Method

This paper uses the GMM estimators that was developed by Arellano and Bond (1991), and specifically the GMM-SYSTEM estimator developed by Arellano and Bover (1995), and Blundell and Bond (1998). These techniques have been applied in many growth studies including those that have investigated the relationship between finance and growth. BenHabib and Spiegel (2000), for instance, have applied the first-differenced GMM estimator method, while the study of Levine et al. (2000) uses not only first-differenced GMM, but also the system GMM estimator.

The general form of the first-differenced GMM approach is to write the regression equation as a dynamic model, and take first-differences to remove unobserved time-invariant country specific effects. Then, the right-hand-side variables in the first-differenced equations are instrumented using levels of the series lagged two periods or more, under the assumption that the time-varying disturbances in the original levels equations are not serially correlated. This procedure has important advantages over simple cross-section regression and other estimation methods for dynamic panel data models. First, estimates will no longer be biased by any omitted variables that are constant over time (unobserved country-specific or "fixed" effects). Secondly, the use of instrumental variables allows parameters to be estimated consistently in models that include endogenous right-hand-side variables. Finally, the use of instruments potentially allows consistent estimation even in the presence of measurement error (Bond, Hoeffler,

& Temple, 2001). To describe this approach, consider the following regression equation.

$$y_{i,t} = \alpha y_{i,t-1} + \beta X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

Where, y is the logarithm of real per capita growth rate of GDP or the ratio of investment to GDP, X represents the set of explanatory variables, η is an unobserved country-specific effect, and ε is the error term. The subscripts i and t represent country and time period, respectively. To eliminate the country-specific effect, take first-differences of Equation (1),

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (2)$$

The use of instruments is required to deal with the likely endogeneity of the explanatory variables, and the problem that the error term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ is correlated with the lagged dependent variable $(y_{i,t-1} - y_{i,t-2})$. Under the assumption that the error term (ε) is not serially correlated, and the explanatory variables (X) are weakly exogenous, the first-differenced GMM dynamic panel estimator uses the following moment conditions:

$$E[y_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \quad \text{for} \quad s \geq 2; t = 3, ..., T \quad (3)$$

$$E[X_{i,t-s}(\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \quad \text{for} \quad s \geq 2; t = 3, ..., T \quad (4)$$

However, there may be a serious statistical shortcoming with this difference estimator. Blundell and Bond (1998), and Alonso-Borrego and Arellano (1999) show that when the time series are persistent and the number of time series observations is small, the first-differenced GMM estimator is poorly behaved. The reason is that, under these conditions, lagged levels of the variables are only weak instruments for subsequent first-differences. Instrument weakness influences the asymptotic and small sample performance of the difference estimator. Asymptotically, the variance of the coefficients rises. In small samples, Monte Carlo experiments show that the weakness of the instruments can produce biased coefficients.

To reduce the potential biases and imprecision associated with the usual difference estimator, this study uses a new estimator that combines the regression in differences with the regression in levels (Arellano & Bover, 1995; Blundell & Bond, 1998). The basic idea is to estimate a system of equations in both first differences and levels, where the instruments for the regression in differences are lagged levels, whereas for the regression in levels, the instruments are the lagged differences of the corresponding variables. Although the levels of y_t may be

correlated with the country-specific effect (η_i) in Equation (1), the differences of these variables are not correlated with η_i, thus permitting us to use lagged first-differences as appropriate instruments in the levels equations. The additional moment conditions for the second part of the system (the regression in levels) are

$$E[(y_{i,t-s} - y_{i,t-s-1})(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (5)$$

$$E[(X_{i,t-s} - X_{i,t-s-1})(\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad (6)$$

We use the moment conditions presented in Equations (3), (4), (5) and (6) and employ a GMM procedure to generate consistent and efficient parameter estimates. However, consistency of the GMM estimator depends on the validity of the instruments. To address this issue, we used two specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). The first is a Sargan test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. It has a $\chi^2_{(m)}$ distribution where m is the number of degrees of freedom given by the difference between the number of instruments and regressors. In the Sargan test, the null hypothesis is that the instrumental variables are uncorrelated with the residuals. The second test examines the hypothesis that the error term $\varepsilon_{i,t}$ is not serially correlated. In the serial correlation test, the null hypothesis is that the error term in the differenced equation exhibits no second-order serial correlation. The test statistic has a standard normal distribution. Failure to reject the null hypotheses of both tests gives support to our regression. In all regressions, the Sargan tests failed to reject the null hypothesis, which supports the validity of instruments used in the regressions. The serial correlation tests also find no second-order serial correlation in all regressions.

ESTIMATION RESULTS

The Impact of Financial Structures on Economic Growth and Investment

Table 1 presents the regression results of GMM-SYSTEM estimators on the relationship between financial structure indicators and GDP per capita growth. The regression results in Table 1 shows that all financial structure indicators are significantly related with GDPPG at 5% level except $fs_{3,t}$ and $fs_{1,t-1}$. Table 1 also shows that all financial structure indicators in period-t are positive while all financial structure indicators in period $t - 1$ are negative. For all regressions, the negative values of lagged financial structure outweigh the positive values of

financial structure in period-*t* indicating the adverse effect of financial structure on economic growth. The results may suggest that to have more market-based financial system have a negative effect on economic growth.

Table 1
Relationship between Structure-Size, Structure-Activity and GDP per Capita Growth

Variables	Regression							
	(1)		(2)		(3)		(4)	
Constant	0.8375	(0.735)	3.5044*	(0.030)	1.6636	(0.201)	0.3515	(0.859)
$GDPPG_{t-1}$	–0.3496*	(0.030)	–0.2297	(0.213)	–0.1943	(0.187)	–0.1399	(0.450)
LINC	–0.0572	(0.477)	–0.1768	(0.124)	–0.0219	(0.910)	–0.0451	(0.755)
$fs_{1,t}$	0.3987*	(0.048)						
$fs_{1,t-1}$	–0.5273	(0.058)						
$fs_{2,t}$			0.2164*	(0.043)				
$fs_{2,t-1}$			–0.2232*	(0.036)				
$fs_{3,t}$					0.2959	(0.083)		
$fs_{3,t-1}$					–0.5760*	(0.045)		
$fs_{4,t}$							0.3681*	(0.016)
$fs_{4,t-1}$							–0.3735*	(0.028)
TRADE	–1.6868*	(0.009)	–1.3188	(0.162)	0.1239	(0.940)	–1.3951	(0.495)
$TRADE_{t-1}$	2.6929*	(0.002)	2.3513*	(0.003)	1.1867	(0.051)	1.9055	(0.234)
GOV_t	0.2713	(0.835)					–0.6463	(0.712)
GOV_{t-1}	–1.1650	(0.422)					–0.0347	(0.983)
INF_t	0.0689	(0.703)					0.1569	(0.564)
INF_{t-1}	–0.2009	(0.240)					–0.1594	(0.611)
Sargan tests		(0.970)		(0.275)		(0.701)		(0.997)
Serial correlation tests AR(2)		(0.213)		(0.089)		(0.184)		(0.232)

Note: In all regressions, transformation used is first difference. All variable are in log. Figures in parenthesis are p-values.
(*) Coefficients are significant at 5% level.

In detail, we find that fs_1 and fs_3 that measured the comparative size of stock market to the banking sector development have relatively bigger net negative impact on growth compared with fs_2 and fs_4 that measured the comparative activity of stock market to banking sector development. This may indicates that Structure-Size have more destabilizing effects on growth than Structure-Activity. Table 1 also shows that the coefficients of financial structure indicators in period-*t* is ranging from 0.2164 to 0.3987 indicating that the impact of financial structure on economic growth is economically important. Meanwhile, the values of coefficient $fs_{1,t}$, $fs_{2,t}$ and $fs_{4,t}$ may suggest that the impact of Structure-Size on GDPPG is almost same with the impact of Structure-Activity on GDPPG. This implies that an increase in the size or activity of stock markets relative to banking sector development has almost similar impact on economic growth.

Table 2 presents the regression results of GMM-SYSTEM estimators on the relationship between financial structure indicators and investment per GDP. The regression results in Table 2 show that the relationship between financial structure indicators and INV in period-*t* is positive and the relationship between lagged financial structure indicators and investment is negative. However, none of the financial structure indicators in Table 2 is significant at 5% significant level. This indicates that financial structure in term of size and activity has no impact on investment.

Table 2
Relationship between Structure-Size, Structure-Activity and Investment per GDP

Variables	Regression							
	(1)		(2)		(3)		(4)	
Constant	–0.8947	(0.082)	–1.0956	(0.097)	–0.8206	(0.015)	–1.4301	(0.264)
INV_{t-1}	0.5998*	(0.000)	0.5213*	(0.005)	0.5695*	(0.000)	0.6221*	(0.000)
LINC	0.0151	(0.482)	0.0097	(0.727)	–0.0077	(0.688)	0.0237	(0.575)
$fs_{1,t}$	0.0555	(0.089)						
$fs_{1,t-1}$	–0.0605	(0.089)						
$fs_{2,t}$			0.0041	(0.874)				
$fs_{2,t-1}$			–0.0028	(0.922)				
$fs_{3,t}$					0.0272	(0.516)		
$fs_{3,t-1}$					–0.0578	(0.112)		
$fs_{4,t}$							0.0299	(0.070)
$fs_{4,t-1}$							–0.0242	(0.286)
TRADE	–0.0027	(0.977)	0.0343	(0.816)	0.1189	(0.346)	0.1976	(0.316)
$TRADE_{t-1}$	0.1504	(0.383)	0.0784	(0.627)	–0.0103	(0.936)	–0.1857	(0.431)
GOV_t	0.1709	(0.122)	0.0647	(0.845)	0.1056	(0.612)	–0.1521	(0.635)
GOV_{t-1}	–0.2765	(0.069)	–0.3216	(0.269)	–0.3498	(0.103)	–0.1563	(0.594)
INF_t			–0.0249	(0.412)	–0.0424*	(0.001)		
INF_{t-1}			–0.0444	(0.331)	–0.0545	(0.088)		
Sargan tests		(0.428)		(0.528)		(0.902)		(0.642)
Serial correlation tests AR(2)		(0.993)		(0.916)		(0.962)		(0.805)

Note: In all regressions, transformation used is first difference. All variable are in log. Figures in parenthesis are p-values.
(*) Coefficients are significant at 5% level.

The estimation results on the relationship between Overall-Structure, GDPPG and INV is presented in Table 3. In all regression equations, the overall financial structure in period-*t* is positively related with GDPPG and INV. The regression results also show that the relationship between lagged overall financial structure, growth and investment is negative. In the case of GDPPG, we find that overall financial structure $FS_{1,t}$ and $FS_{1,t-1}$ are significant at 5% level and the coefficients for these variables are 0.4984 and –0.4504, respectively. This implies that the net effect of FS_1 on economic growth is positive. The finding supports

the important role of market-based financial system on economic growth. The regression results also show that $FS_{2,t}$ is not significantly related with GDPPG. Meanwhile, $FS_{2,t-1}$ is significant at 5% level and the relationship between $FS_{2,t-1}$ and GDPPG is negative. The results suggest that the different measure of overall financial structure has different impact on economic growth. In the case of INV, both overall financial structure indicators are not significant at 5% level. This indicates that to have market-based financial system did not help to increase the level of investment in the country.

Table 3
Relationship between Overall Financial Structure, GDP per Capita Growth and Investment per GDP

Variables	GDP per capita growth				Investment per GDP			
	(1)		(2)		(3)		(4)	
Constant	1.1114	(0.601)	–2.0350	(0.410)	–0.8853*	(0.039)	–0.7015	(0.210)
$GDPPG_{t-1}$	–0.3643*	(0.046)	–1.0461	(0.506)				
INV_{t-1}					0.5083*	(0.008)	0.5386*	(0.006)
LINC	–0.0513	(0.577)	0.0542	(0.468)	–0.0065	(0.677)	–0.0103	(0.659)
$fs_{1,t}$	0.4984*	(0.001)			0.0169	(0.690)		
$fs_{1,t-1}$	–0.4504*	(0.028)			–0.0494	(0.225)		
$fs_{2,t}$			0.3147	(0.101)			0.0373	(0.313)
$fs_{2,t-1}$			–0.5031*	(0.045)			–0.1675	(0.052)
$TRADE_t$	–0.9127	(0.158)	–1.0461	(0.506)	0.0896	(0.681)	0.0953	(0.516)
$TRADE_{t-1}$	2.2504*	(0.003)	1.5056	(0.060)	0.0888	(0.611)	0.0447	(0.754)
GOV_t	1.1227	(0.534)	–2.3618	(0.289)	0.2238	(0.326)	0.1574	(0.362)
GOV_{t-1}	–1.8789	(0.198)	1.2523	(0.430)	–0.4563	(0.056)	–0.3178	(0.077)
INF_t	0.1328	(0.523)			–0.0283	(0.116)	–0.0416*	(0.001)
INF_{t-1}	–0.1156	(0.427)			–0.0539	(0.234)	–0.0414	(0.298)
Sargan tests		(0.985)		(0.904)		(0.934)		(0.888)
Serial correlation tests AR(2)		(0.140)		(0.060)		(0.981)		(0.998)

Note: In all regressions, transformation used is first difference. All variable are in log. Figures in parenthesis are p-values.
(*) Coefficients are significant at 5% level.

In summary, estimation results show that both indicators of financial structure; Structure-Size and Structure-Activity are significantly related with economic growth. However, the net effect of individual financial structure indicator on growth is negative. These results suggest that to have more market-based financial system have a destabilizing effect on economic growth. However, from the results of Overall Structure, this study finds that the Overall Structure might have a positive or negative effect on economic growth depends on the indicator used in the regression. In the case of investment, we find that

Structure-Size and Structure-Activity have no impact on the level of investment. The level of investment is also not affected by the overall structure of financial sector.

The Impact of Financial Structures on Economic Growth and Investment: Comparison between Low- and Middle-Income Countries, and High-Income Countries

The effect of financial structures on economic growth and investment may depend on the level of income of the country. To investigate this, we have divided our sample into two groups, low- and middle-income countries and high-income countries. Then, the regressions have been carried out for these two groups of countries separately. The regression results between overall financial structure and GDPPG for both groups of countries are presented in Table 4. In the case of high-income countries, the results show that $FS_{1,t}$ is positive and significant at 5% level, while $FS_{1,t-1}$ is negative but not significant. The result suggests the positive and important role of financial structure on economic growth in developed countries. Meanwhile, $FS_{2,t}$ and $FS_{2,t-1}$ has a negative relationship with GDPPG, however, both are not significant. Regression results clearly show that the different measures of overall financial structure have a different effect on economic growth in the high-income countries. In the case of low- and middle-income countries, both $FS_{1,t}$ and $FS_{2,t}$ are positive but not significant at 5% level. The regression results also show that $FS_{1,t-1}$ and $FS_{2,t-1}$ are significant at 5% level and both have a negative sign. This indicates the negative effects of financial structure on economic growth in low- and middle-income countries.

Table 5 presents the regression results between overall financial structure and INV for two groups of countries being studied. In the case of high-income countries, only $FS_{2,t}$ is significant at 5% level. However, the regression result suggests that $FS_{2,t}$ have a negative sign. This implies that market-based financial system have a negative effect on investment in high-income countries. In the case of low- and middle-income countries, all measures of financial structure are not significant at 5% level. The results show that financial structure has no impact on the level of investment in the low- and middle income countries. The finding suggests the different effect of financial structure on investment in the high-income countries, and low- and middle-income countries. The level of investment will decrease in the high-income country with more developed stock markets relative to banking sector development. Meanwhile, to have market-based financial system did not help to increase the level of investment in the low- and middle-income countries.

Table 4
Relationship between Overall Financial Structure and GDP per Capita Growth in High-Income Countries, and Low- and Middle-Income Countries

Variables	High-income				Low- and middle-income			
	(1)		(2)		(3)		(4)	
Constant	–4.5347	(0.585)	2.4661	(0.680)	2.5437	(0.110)	0.5581	(0.704)
$GDPPG_{t-1}$	–0.3249	(0.091)	–0.5732*	(0.000)	0.0998	(0.730)	0.3148	(0.248)
LINC	0.4528	(0.525)	–0.2316	(0.552)	–0.0078	(0.927)	–0.0076	(0.947)
$fs_{1,t}$	0.6497*	(0.007)			0.3465	(0.110)		
$fs_{1,t-1}$	–0.4754	(0.055)			–0.6083*	(0.024)		
$fs_{2,t}$			–0.0957	(0.908)			0.2633	(0.055)
$fs_{2,t-1}$			–0.0070	(0.993)			–0.5589*	(0.035)
$TRADE_t$			–2.6836*	(0.007)	–1.7411	(0.214)		
$TRADE_{t-1}$			1.4847	(0.522)	2.4867*	(0.014)		
INF_t					–0.1146	(0.738)	0.0389	(0.870)
INF_{t-1}					–0.5839*	(0.000)	–0.2579*	(0.023)
Sargan tests		(0.679)		(1.000)		(1.000)		(0.999)
Serial correlation tests AR(2)		(0.190)		(0.128)		(0.596)		(0.875)

Note: In all regressions, transformation used is first difference. All variable are in log. Figures in parenthesis are p-values.
(*) Coefficients are significant at 5% level.

Table 5
Relationship between Overall Financial Structure and Investment per GDP in High-Income Countries, and Low- and Middle-Income Countries

Variables	Developed countries				Developing countries			
	(1)		(2)		(3)		(4)	
Constant	–2.9183	(0.358)	–1.8006	(0.289)	–1.6019	(0.095)	–1.8231	(0.132)
INV_{t-1}	0.9137	(0.175)	0.1473	(0.685)	0.3132	(0.246)	0.2895	(0.356)
LINC	0.1674	(0.446)	–0.2528	(0.115)	0.0102	(0.712)	0.0182	(0.565)
$fs_{1,t}$	–0.1021	(0.083)			0.0434	(0.259)		
$fs_{1,t-1}$	0.0486	(0.225)			–0.0799	(0.058)		
$fs_{2,t}$			–0.1001*	(0.028)			0.0170	(0.711)
$fs_{2,t-1}$			–0.0214	(0.658)			–0.0471	(0.417)
$TRADE_t$			–0.4581	(0.055)	0.0239	(0.934)	0.1383	(0.427)
$TRADE_{t-1}$			–0.1597	(0.800)	0.1521	(0.534)	–0.0516	(0.832)
GOV_t	–1.9688*	(0.016)	–2.1583*	(0.021)	0.2338	(0.601)	0.0919	(0.843)
GOV_{t-1}	1.4775	(0.093)	0.5296	(0.564)	–0.6652*	(0.038)	–0.5607*	(0.037)
INF_t					–0.0291	(0.422)	–0.0415	(0.196)
INF_{t-1}					–0.1144	(0.060)	–0.1142	(0.068)
Sargan tests		(0.873)		(1.000)		(1.000)		(1.000)
Serial correlation tests AR(2)		(0.610)		(0.353)		(0.455)		(0.503)

Note: In all regressions, transformation used is first difference. All variable are in log. Figures in parenthesis are p-values.
(*) Coefficients are significant at 5% level.

In summary, the effect of the overall financial structure on economic growth and investment is different between high-income countries, and low- and middle-income countries. The market-based financial system has a positive impact on growth performance in high-income countries. The results show that the impact of financial structure on economic growth in high-income countries is economically significant. However, the impact depends on the indicator used in the regression. In contrast, to have a market based financial system might have a negative effect on economic growth in the low- and middle-income countries. A market-based financial system also has a negative impact on the level of investment in high-income countries but do not affect the level of investment in the low- and middle-income countries. These findings indicate that the effect of financial structures on economic growth and investment depends on the level of development of the country.

DISCUSSION AND CONCLUSION

To study the impact of financial structure on economic growth and investment, we have constructed four indicators to measure the financial structure of the country. These indicators have been categorized into two groups, Structure-Size and Structure-Activity. The results find that three out of four indicators of financial structure in period-t are significantly and positively related with GDP per capita growth. This may indicate the importance of Structure-Size and Structure-Activity of financial system for economic growth. The findings imply that the development of stock markets whether through the expansion in the size or activity of stock markets will increase the economic growth. However, after taking into account the negative effect of lagged financial structure on GDP per capita growth, this paper finds that financial structure has a mixed effect on economic growth. The Structure-Size could have a positive or negative net effect on economic growth depends on indicator used in the regression. Meanwhile, both Structure-Activity indicators have a negative net effect on economic growth. In the case of investment per GDP, none of financial structure indicator is significant. This implies that to have a more market-based financial system does not increase the level of investment.

To analyze further the relationship between financial structure, economic growth and investment, this paper has constructed two indicators to measure the overall structure of financial system. The estimations show mixed results where one overall structure indicator has a positive net effect on economic growth, while another one has a negative net effect. The findings imply that the effect of overall financial structure on economic growth depends on the indicator used in the regression. Meanwhile, in the case of investment, this paper finds that both overall financial structure indicators are not significantly related with investment

per GDP. The fact that financial structure could have a positive net impact on GDP per capita growth but not on investment per GDP indicates that the market-based financial structure will improve the investment efficiency but not the level of investment.

Finally, this paper investigated the relationship between financial structure, economic growth and investment in the case of high-income countries, and low- and middle-income countries. This study finds that the net effect of the overall financial structure indicator on economic growth in high-income countries is positive and significant. In contrast, this net effect is negative in the case of low- and middle-income countries. These findings suggest that to have more developed stock markets relative to the banking sector will promote better growth in the high-income countries but not in the low- and middle-income countries implying that the impact of financial structure depends on the level of income of the country. Meanwhile, only in the case of high-income countries, investment per GDP is significantly related with financial structure but not in the case of low- and middle-income countries. These findings provide strong evidence that the effect of financial structure on investment depends on the level of income of the country. However, the relationship between financial structure and investment in the case of high-income countries is negative indicating that market-based financial structure has a negative effect on investment in these countries.

The empirical evidence reported in this paper has several implications for development strategies and policy. With regard to the relationship between financial sector development and economic growth, although stock markets provide better prospect for economic growth, it was found that banks and stock markets play complementary roles in economic growth. Thus, for long-term growth strategies, the finding strongly recommended that countries should develop their overall financial sectors rather than focusing on a specific financial sector (banks or stock markets). In this context, policies that encourage the presence of both a better developed banking sector and stock markets could help the accumulation of the capital that is necessary to finance projects with large fixed costs. The absence of both well developed banking sectors and stock markets can severely affect a country's long-term growth prospects.

The analysis also suggests that more effort should be given to the increase in banking sector and stock market activities instead of concentrating on the size. For banks, this can be implemented by giving savers a wider range of investment and borrowing opportunities and giving companies more alternative sources of funding. For stock markets, effort should be devoted to increasing the liquidity and efficiency of the market. With regard to financial structures, it was found that a market-based financial structure helps to promote growth for

developed countries but not for the developing countries. For developing countries with a market-based financial structure, this finding implies that in order to gain an advantage from their financial structure, effort should also be devoted to developing their banking sector as well as to increasing the efficiency of their stock markets. These two factors could be a reason why having a market-based financial structure has not affected economic growth in developing countries.

In conclusion, a positive impact of overall financial structure on economic growth implies that market-based financial system, as expected, will increase the investment efficiency in the high-income countries. Meanwhile, a negative impact of financial structure on investment implies that market-based financial system will reduce the level of investment in the high-income countries probably due to the negative wealth effect of stock market development on saving rate.

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APPENDIX 1: List of Countries

Low- and middle-income countries	High-income countries
Cote d'Ivoire	Austria
Ghana	Australia
India	Belgium
Indonesia	Canada
Kenya	Denmark
Nigeria	Finland
Pakistan	France
Colombia	Greece
Egypt	Israel
Jamaica	Italy
Morocco	Japan
Peru	Netherlands
Philippines	Norway
South Africa	New Zealand
Sri Lanka	Portugal
Thailand	Singapore
Argentina	Spain
Chile	Sweden
Malaysia	Switzerland
Mexico	United Kingdom
Uruguay	USA
Venezuela	
Korea	